

## **X-Ray Microtomography as a Nondestructive Tool for Characterization of Thermal Sprayed Ceramic Deposits**

*A. Kulkarni, H. Herman and A. Goland (SUNY, Stony Brook) and B. Dowd (NSLS)*

Abstract No. Kulk1836

Beamline(s): **X27A**

**Introduction:** Computed Microtomography (CMT) has been explored to elucidate microstructure-property correlations in thermal sprayed ceramic deposits. Pores and cracks in freestanding deposits have been characterized using the synchrotron x-ray source at X27A Beamline at BNL. The effects of processing techniques (air and vacuum plasma sprayed (APS & VPS) and high velocity oxy-fuel (HVOF) process) and feedstock characteristics (powder precursor and morphology) on microstructure development in the coatings have been investigated. Coatings of alumina based systems ( $\text{Al}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$ -13%  $\text{TiO}_2$  and  $\text{Al}_2\text{O}_3$ -25%  $\text{MgO}$  spinel) have been examined. Thermal, dielectric and mechanical properties of the coatings have been correlated to microstructural features observed. Studies have been carried out on as-sprayed and heat-treated coatings to observe microstructural changes and its influence on properties. CMT measurements have shown that HVOF deposits have flat, in-plane layered pores, where-as the plasma sprayed coatings display globular pores. These results have explained in a dramatic fashion the apparent anomalous difference between thermal conductivity for HVOF and plasma sprayed coatings [1].

**Acknowledgements:** This work was sponsored by the MRSEC program of the National Science Foundation under award DMR-9632570.

**References:** Kulkarni A. *et. al.*, "Computed microtomography studies to characterize microstructure-property correlations in thermal sprayed alumina deposits." Scripta Mat. 43 (2000) pp 471-476.